Section of Epidemiology and State Medicine.

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The Incidence of Pneumonia.

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More than 70,000 deaths occur annually in England and Wales from pneumonia and bronchitis. The relative number of deaths ascribed to lobar pneumonia, broncho-pneumonia and bronchitis varies according to the fashion, or custom, in regard to the form of certification in vogue from time to time. It is consequently impossible to compare, with complete accuracy, the number of deaths over a period of years from any one of these diseases.

In England and Wales during the last thirty years the pneumonia and bronchitis mortality curves follow each other very closely, and it would appear that some measure of stability in the form of certification has been attained (Table I). In

Table I.—Death-rates per million from Pneumonia, all Forms, and Bronchitis, England and Wales, 1897-1925.

Year	Pneumonia	Bronchitis	Total
1897-1900	1,216	1,256	2,472
1901-1905	1,274	1,244	2,518
1906-1910	1,234	1,094	2,328
1911	1,040	1,013	2,053
1912	1,024	1,089	2,113
1913	1,025	1,071	2,096
1914	1,084	1,087	2,171
1915	1,356	1,437	2,793
1916	1,065	1,248	2,313
1917	1,141	1,249	2,390
1918	1,654	1,232	2,886
1919	1,058	1,238	2,296
1920	987	1,010	1,997
1921	916	889	1,805
1922	1,073	1,073	2,146
1923	870	852	1,724
1924	1,003	973	1,976
1925	951	906	1,857

Scotland, since 1891, the pneumonia death-rate has become progressively higher, whilst the bronchitis rate has fallen from 165 in the decennium 1891-1900 to 90·8 in the quinquennium 1921-1925, a drop of 45 per cent. This apparent increase of pneumonia mortality in Scotland is probably due largely to the transference of bronchitis deaths. The combined rate from bronchitis and pneumonia has fallen to the extent of 23 per cent., which is comparable with that which has occurred in England and Wales over the same period.

In England and Wales the combined rate has fallen from 247 in the period 1897-

1900 to 190 in the period 1921-1925, a decline of 23 per cent., the respective percentage figures for bronchitis and pneumonia being 21 and 25.

Pneumonia mortality is heavier in the northern than in the southern group of counties, including London. The relative death-rates in these two areas in the period 1911-1914 were 1314 and 903, showing an excess in the north of 31 per cent. Comparable rates in the period 1921-1925 were 1,223 and 840, the relative excess in the north being approximately the same. Whilst the decrease in England and Wales, as a whole, was 9 per cent., in the north and south it was 7 per cent. The relatively high mortality in the north is therefore maintained (Table II).

TABLE II.—DEATH-RATES FROM PNEUMONIA, NORTH, MIDLANDS, AND SOUTH, INCLUDING LONDON, 1921-1925.

Year	North	Midlands	South
1921	1,164	778	798
1922	1,286	900	1,017
1923	1,150	720	720
1924	1,293	837	877
1925	1,222	824	789

The mortality from pneumonia in England and Wales varies from year to year. The north, the midlands and the south all share in any fall or rise which occurs in any one year (Table II). There is apparent, apart from influenzal occurrences, no such periodicity as is found in certain other infections. Therefore, some factor must be influencing the prevalence of the mortality from these diseases which is common to the whole country.

TABLE III.—DEATH-RATES FROM ALL FORMS OF PNEUMONIA AND MEAN ANNUAL TEMPERATURE (DISTRICT VALUES), ENGLAND AND WALES, 1911-1925.

Year	Death-rate	Mean annual temperature
1911	1,216	50·3
1912	1,024	49·2
1913	1,025	49·8
1914	1,084	50·1
1915	1,356	48·5
1916	1,065	48·9
1917	1,141	47·8
1918	1,654	49·5
1919	1,058	47·8
1920	987	49·6
1921	916	51·1
1922	1,073	48·0
1923	870	48·7
1924	1,003	49·0
1925	951	48·9

Climatic conditions doubtless play a part in determining the incidence of catarrhal affections of the respiratory system. The influence of the climate upon health, however, is a subject which has been incompletely studied. Neither extreme heat, nor extreme cold, nor extreme variability, presents the optimum conditions for physical health.

In nine representative cities of America, in which the mean annual temperature ranged from 44·1° F. to 69·1° F. during 1911-1917, there was less pneumonia amongst the white population of the four warmer cities than of the four colder cities. Nevertheless, the warmest city did not have the lowest rate, nor did the coldest city have the highest.

In England and Wales the mortality from pneumonia is affected by atmospheric

temperature. Table III shows the mean annual temperature and the death-rates from all forms of pneumonia over a series of fifteen years. The following table gives the number of deaths from pneumonia in England and Wales during the first quarters of each of the years 1912-1925, and the mean temperature of corresponding periods. If

TABLE IV.—NUMBER OF DEATHS FROM PNEUMONIA IN ENGLAND AND WALES DURING THE FIRST QUARTER OF EACH YEAR, AND THE MEAN TEMPERATURE (GREENWICH) OF CORRESPONDING PERIODS, 1912-1925.

Year	No. of deaths	Mean temperature
1912	13,110	43·6
1913	13,865	42·4
1914	13,599	42·5
1915	18,717	40·8
1916	12,648	41·5
1917	16,284	36·4
1918	14,506	42·3
1919	20,155	38·1
1920	13,814	44·3
1921	12,836	45·5
1922	16,605	41·2
1923	10,517	44·8
1924	16,678	39·8
1925	12,123	42·2

these figures be charted the similarity of the curves will be evident and the relationship of the two in the series of first quarters is so close that, given the mean temperature of the first quarter of any one year, it is possible to calculate, approximately, the pneumonia death-rate for that period. The coefficient of correlation between the number of deaths and the mean temperatures during the first quarters of the years 1912-1924 works out at $-0{\cdot}768 \pm 0{\cdot}076$.

The influence of air temperature is not so apparent when the relative means of different areas are considered together with the respective death-rates. The mean annual temperature in the south is consistently about two degrees higher than that in the north, whereas the mean temperature of the northern area varies but slightly from that in the midlands (Table V). It might therefore be expected that, if air

TABLE V.—MEAN ANNUAL TEMPERATURE IN THE NORTH, MIDLANDS AND SOUTH OF ENGLAND AND WALES, 1911-1925.

Year	N.W. and N.E. (Average)	Midlands	S.W. and S.E. (Average)
1911	49·2	49·6	50·8
1912	48·0	48·2	49·8
1913	48·8	49·0	50·5
1914	49·3	49·6	50·5
1915	47·4	47·6	49·1
1916	48·2	48·0	49·6
1917	47·1	47·3	48·2
1918	48·7	49·1	50·1
1919	46·7	47·2	48·5
1920	49·5	49·0	50·4
1921	50·3	50·8	52·0
1922	47·3	47·5	48·8
1223	47·9	48·2	49·6
1924	48·3	48·5	49·7
1925	48·1	48·5	49·7

temperature is the all-important factor, pneumonia incidence in the north and midlands would be similar, and that in the south it would be relatively low. Such is not the case. The ratio between the pneumonia death-rates in the north and midlands,

taking the average of two periods, 1911-1914 and 1921-1925, is 1·42 to 0·1, whilst the ratio between death-rates in the midlands and south, including London, is 1·02 to 0·1 (Table VI).

TABLE VI.—AVERAGE DEATH-RATES FROM PNEUMONIA IN THE NORTHERN, MIDLAND AND SOUTHERN COUNTIES OF ENGLAND AND WALES, 1911-1914 AND 1921-25.

Area	Period	Average population	Average number of deaths	Average death-rate
North	1911-14	12,287,195	16,151	1,314
	1921-25	12,932,780	15,817	1,223
Midland	1911-14	11,472,851	9,795	968
	1921-25	12,139,827	9,859	812
South	1911-14	10,398,633	9,494	903
	1921-25	10,508,909	8,829	840

In Manchester, a typical northern town, the coefficient of correlation for the years 1925 and 1926 between the weekly mean temperatures and the weekly number of notified cases of pneumonia having their onset in those several weeks is 0·703 ± 0·047. An attempt to correlate the number of cases occurring daily, according to the date of onset of illness, with the daily temperature showed no definite correlation. It might be thought that fluctuations of temperature, rather than the annual means, should show some definite relation to pneumonia mortality. An effort to measure the relation between the extremes of temperature experienced in successive weeks in Manchester, and the respective number of pneumonia cases occurring in those weeks, or in the weeks following, produced negative results. This may be due to faulty data regarding the dates of onset of illness, or, if the data are correct, it may indicate that the comparatively small fluctuations of temperature which are usual in this country have no serious effect upon pneumonia incidence.

All these considerations contribute in showing that, although there is some direct relation between air temperature and pneumonia mortality, there are other factors of predominating importance which are responsible for the greater incidence of pneumonia in the northern compared with the southern counties.

It is in the large towns that pneumonia prevalence is excessive, and it is the environmental conditions of these towns which are the determining cause. Fogs of a type peculiar to large towns are harmful. In order to demonstrate the effect of black smoke on health in connection with fogs, particulars were collected in Manchester regarding the deaths from pneumonia in each of the six weeks preceding, and in each of six weeks containing and following fifty-nine consecutive fogs in the years 1897 to 1910. Only fogs of two or more days' duration were used. The results are shown in Table VII. The figures express a probability that the increase in the number of

TABLE VII.—PNEUMONIA AND FOGS, MANCHESTER, 1897-1910.

	Weeks preceding the fog.					Weeks containing and following fog.				
	6	5	4	3	2	1				
Number of deaths from pneumonia	1351	1389	1345	1442	1442	1434	1573	1638	1657	1710	1631	1589
Number of deaths from bronchitis	1317	1301	1330	1526	1479	1627	1808	1864	1848	1699	1729	1749

deaths was partly due to fog or to some accompanying phenomenon, fog merely accentuating normal conditions. In a recently made investigation,[1] Russell concludes that although the number of respiratory deaths in the week following fog is more highly correlated with the fogginess than with the temperature of the previous

1 *Lancet*, 1926 (ii), 1128.

week over certain periods, yet, on the average, a low temperature exercises a greater influence.

The direct influence of fog on the general trend of the pneumonia death-rate is not great. Recorded fogs are fewer now in Manchester than in the past, but the heavy decline in the number of fogs has not been associated with any decline of corresponding magnitude in the number of deaths from pneumonia and bronchitis, as shown by the following figures for Manchester:—

Period	Number of recorded fogs	Death-rate from pneumonia and bronchitis
1891-1900	416	247
1901-1910	234	242
1911-1920	107	258
1921-1925 (5 years)	57	288

Nor is any close association observed if individual years be examined. Table VIII gives the number of fogs and the death-rates in Manchester for pneumonia and

TABLE VIII.—YEARLY NUMBER OF RECORDED FOGS AND THE CORRESPONDING DEATH-RATES FROM PNEUMONIA AND BRONCHITIS, MANCHESTER, 1916-1925.

Year	Days of fog	Death-rate Pneumonia	Death-rate Bronchitis	Total Death-rate
1916 ...	15 ...	125 ...	160 ...	285
1917 ...	19 ...	122 ...	144 ...	266
1918 ...	5 ...	184 ...	137 ...	321
1919 ...	14 ...	124 ...	164 ...	288
1920 ...	10 ...	117 ...	141 ...	258
1921 ...	5 ...	124 ...	143 ...	267
1922 ...	7 ...	137 ...	171 ...	308
1923 ...	7 ...	130 ...	145 ...	275
1924 ...	12 ...	133 ...	163 ...	296
1925 ...	26 ...	127 ...	181 ...	308

bronchitis in each of the years 1916 to 1925. There appears to be no correlation. For instance, in 1916 the number of fogs was fifteen and the death-rate 285. In 1922 fogs numbered seven and the rate was 308. In 1925 there were twenty-six recorded fogs and the death-rate was again 308.

Although, therefore, fog may exert some influence upon pneumonia prevalence, such influence is, in the mass, unnoticeable and represents only a minor and unimportant factor in the epidemiology of these diseases. Fog is only a contributor to those conditions which tend to occlude the rays of the sun. Light is shut out from the northern cities of England over a great part of the year. The average annual percentage of possible sunshine during the period 1881 to 1915 in certain towns was as follows: Manchester 24, Hull 22, Southport 35, Blackpool 36. In the northern area Manchester is above that of Hull only.

Records of light tests made in Manchester and Timperley, a district within seven miles of the centre of the town on its southern border, show clearly the effect of town conditions upon the amount of light and upon the quantity of ultra-violet rays which are able to penetrate the prevailing gloom (Table IX). The light tests

TABLE IX.—PERCENTAGE OF LIGHT RECEIVED IN MANCHESTER AS COMPARED WITH TIMPERLEY (100).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1925	38	43·5	91	73	57	53	68·5	60	64·5	55·5	47	39
1926	43	52	55	51	50	49	66	61	48·5	64·5	50·5	37

were made by the iodine method, and the tests for ultra-violet rays by the acetone blue method. It will be noted that throughout the year Manchester receives but 54 per cent. of the light received in its more favourably situated suburb, and that during the winter months the percentage is even lower. As regards the ultra-violet rays, records made during the last nine months show that, as compared with Timperley, 36 per cent. of the rays are, on the average, occluded.

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In the words of Leonard Hill, smoke pollution cuts off from the cities ultra-violet rays, warmth and light, destroys green food, the primary source of vitamins, making the streets and parks filthy and dismal, and driving the people away from health-giving outdoor exercise into unhealthy, sedentary and indoor amusements.

Pneumonia mortality is greater in county boroughs than in urban and rural districts. This statement holds good, whether speaking relatively of districts in the north or in the south.

Pneumonia is an infectious disease, and is spread from person to person, and precedent catarrhs are rapidly disseminated amongst persons living in close contact with one another. Like other infections, the spread is favoured by the aggregation of people.

Measles, whooping-cough, scarlet fever and, to a less extent, diphtheria, are more prevalent in the north than in the south, and more so in towns than in rural districts.

TABLE X.—DEATH-RATES PER 100,000 FROM CERTAIN INFECTIOUS DISEASES IN THE NORTHERN AND SOUTHERN COUNTIES (INCLUDING LONDON) AND IN THE COUNTY BOROUGHS AND RURAL DISTRICTS OF ENGLAND AND WALES, 1922-1925.

	Scarlet fever	Diphtheria	Measles	Whooping-cough	Pneumonia
North	3·8	6·2	19·5	15·8	123·4
South	2·4	9·9	11·2	11·4	84·8
Percentage excess in North	37	−37	42	23	31
County Boroughs	3·4	7·8	18·8	16·2	121·4
Rural Districts...	1·7	4·3	6·4	10·2	65·8
Percentage excess in County Boroughs ...	50	46	66	37	46

Table X gives the figures for north and south, including London, and for the county boroughs and rural districts during the years 1922-1925. If London be excluded, the relative excess in the north is greater and diphtheria falls to some extent into line. It will be seen that the excess of mortality from these diseases is relatively as great as, or greater than, is the case with pneumonia. There is no evidence that this undue prevalence is due directly to fogs or lack of sunshine. Nor is it due to poverty, for those persons living in the poorer areas are apparently less susceptible to these diseases. Although climatic and atmospheric conditions may contribute to the prevalence of pneumonia by lowering the vitality of the individual, their influence is neither predominant, nor even prominent.

Distribution of population is the important factor. The greater the density of population in any area, the higher is the mortality from pneumonia.

The occurrence of a higher pneumonia mortality in towns than in rural districts is not peculiar to this country. Statistics of the registration states of America indicate that deaths from pneumonia in the cities exceed those in the rural districts by about 50 per 100,000, the rates being higher in the cities at all ages (Table XI).

TABLE XI.—DEATH-RATES FROM PNEUMONIA IN THE CITIES AND RURAL DISTRICTS OF THE REGISTRATION STATES OF AMERICA, 1911-1917.

	1911	1912	1913	1914	1915	1916	1917
Cities ...	153	152	156	149	156	165	178
Rural ...	105	103	102	97	106	112	121

There is considerable evidence to show that the excess of deaths from pneumonia in the northern counties of England and Wales is due to the greater aggregation and density of the population compared with the south. The population of the northern counties in 1925 was about 13,071,890, and of the southern counties it was 6,140,970, or, including London, 10,752,970. In the north 55 per cent., or more than half of the people, live in towns with populations of over 50,000, whereas 25 per cent. are in communities of less than 20,000. In the counties of the southern group the position is reversed, 25 per cent. of the population live in towns of over 50,000

persons, and 48 per cent. in communities of less than 20,000. If London be included, adding an urban population of 4,612,000, the advantage still remains with the south (Table XII).

TABLE XII.—DISTRIBUTION OF POPULATION IN NORTH AND SOUTH, 1925 (EXCLUDING LONDON).

	North			South		
In communities of:—	Urban	Rural	Total	Urban	Rural	Total
Under 10,000	1,063,280	372,070	1,435,350	684,201	473,180	1,157,381
10 to 20,000	1,458,050	489,060	1,947,110	671,350	1,097,556	1,768,906
20 to 50,000	1,844,040	627,900	2,471,940	1,186,790	469,659	1,656,449
50 to 100,000	1,456,130	292,660	1,748,790	596,484	—	596,484
100,000 and over	5,468,700	—	5,468,700	961,750	—	961,750
Total	11,290,200	1,781,690	13,071,890	4,100,575	2,040,395	6,140,970

Pneumonia mortality, both in the northern and southern counties, varies directly with the degree of aggregation of the several populations. The northern counties, placed in order of their pneumonia mortality-rates reckoned over the last three years, counties with the higher rates being placed first, are Lancashire, Durham, Yorkshire, Northumberland, Cheshire, Cumberland, Westmorland. This is the order in which the counties are placed if they be classified according to the percentage of the population of each living in communities of 50,000 or over, except that Yorkshire and Durham change places (Table XIII). And it will be noted that if the counties

TABLE XIII.—DEATH-RATES FROM PNEUMONIA AND DISTRIBUTION OF POPULATION IN THE NORTHERN COUNTIES, 1923-1925.

County	Pneumonia death-rate	Per cent. of population living in communities of over 50,000	No. of persons per acre. (Census 1921)
Lancashire	132	65	4·11
Durham	129	53	2·27
Yorkshire	126	55	1·05
Northumberland	111	50	0·57
Cheshire	91	35	1·50
Cumberland	91	30	0·28
Westmorland	60	0	0·13

be grouped in the order of the density of their population, those with the larger number of persons per acre have a higher death-rate from pneumonia than those with the smaller number of persons per acre.

The same relation between the mortality-rate and crowding on area exists in the several towns of Lancashire with individual exceptions. There are in Lancashire 15 county boroughs, in 8 of which the number of persons per acre exceeds 20, and in 7 of which the number per acre is less than 20. Taken in these two groups the average pneumonia death-rate for the three years 1923-1925 was, in the first group 146, and in the second group 110. Further, it can be shown that in a representative large town a similar relationship is evident in the several districts of that town. If the 35 wards of Manchester be grouped into those in which the number of persons per acre is below 50, between 50 and 110 and 100 or more, the pneumonia mortality becomes progressively greater in each group. This is so both for lobar and for broncho-pneumonia, but the proportion of cases of the latter disease is relatively much greater in the more crowded areas than is the case with lobar pneumonia (Table XIV).

TABLE XIV.—DEATH-RATES PER 100,000 FROM LOBAR AND BRONCHO-PNEUMONIA IN GROUPS OF WARDS, MANCHESTER, 1925-1926.

Wards	Population	Average death-rate		Total Death-rate
		Lobar	Lobular	
With less than 50 persons per acre	342,135	29	33	62
With 50 to 100 persons per acre	291,716	44	69	113
With 100 or more persons per acre	124,354	59	77	136

Other data, also, go to show that overcrowding on area influences the broncho-pneumonia rate much more than it does the lobar pneumonia rate. This may indicate that broncho-pneumonia is more infectious, and more easily spread from person to person, than the lobar variety. The relationship between overcrowding on area and pneumonia mortality in the various wards of the city is true in the gross, but there are exceptions, the most outstanding of which is given by two wards: (*A*) New Cross, and (*B*) Beswick. Ward (*A*) has a population of 29,713, and Ward (*B*) of 32,611. The wards are contiguous and have a similar type of population. The number of persons per acre in Ward (*A*) is 98, and in Ward (*B*) 128, yet the mortality rate in (*A*) is 196 and in (*B*) 105. It is possible that this difference is due, in part, to the greater overcrowding in individual houses in Ward (*A*). The figures in Table XV are suggestive in this respect, and there can be no doubt from a study of Table XVI that overcrowding in individual houses is a prominent factor

TABLE XV.—ACCOMMODATION PER PERSON IN THE WARDS OF NEW CROSS AND BESWICK (INVESTIGATED CASES OF INFECTIOUS DISEASE), 1925 AND 1926.

	New Cross		Beswick	
No. of rooms per person	No. of persons living in infected dwellings	Per cent. of total	No. of persons	Per cent.
Under 0·3	138	9·3	22	1·6
0·3 to 0·5	303	20·6	210	15·7
0·5 to 0·7	553	37·6	490	36·6
0·7 to 1·0	185	12·5	271	20·3
1·0 and over	292	19·0	345	25·8

in the spread of these diseases. It is noticeable that here again lobar pneumonia is influenced to a much less extent than broncho-pneumonia by immediate environmental conditions.

TABLE XVI.—ACCOMMODATION PER INDIVIDUAL OF PERSONS LIVING IN INFECTED HOUSES. PNEUMONIA, 1925-1926.

Accommodation per individual	Number of persons living in infected dwellings	Per cent. of total number of persons living in infected dwellings	Percentage distribution of population. Census 1921
Lobar.			
Under 0·3	161	2·5	0·5
0·3 to 0·5	816	12·8	7·4
0·5 to 0·7	1,935	30·4	24·2
0·7 to 1·0	1,258	19·8	19·0
1·0 and over	2,191	34·4	49·0
Lobular.			
Under 0·3	343	5·3	0·5
0·3 to 0·5	1,368	21·3	7·4
0·5 to 0·7	2,335	36·4	24·2
0·7 to 1·0	937	14·6	19·0
1·0 and over	1,424	22·2	49·0
Influenzal.			
Under 0·3	12	0·6	0·5
0·3 to 0·5	201	9·4	7·4
0·5 to 0·7	640	30·0	24·2
0·7 to 1·0	383	17·9	19·0
1·0 and over	895	42·0	49·0

From a study of the age incidence of these two varieties of pneumonia, from the difference in the class of persons attacked and from the different distribution of cases over the year, it is clear that the two diseases under consideration are distinct entities from an epidemiological point of view. All the figures which have been quoted tend to show that overcrowding on area, and in individual houses, is the

essential contributing factor in the spread of pneumonia. In the case of lobar pneumonia the immediate environmental conditions are of less importance. It is possible that the incidence of lobar pneumonia depends more upon the incidence of human carriers of the pneumococcus, which varies from time to time, but becomes greater during the winter months immediately preceding the period of the year when mortality from pneumonia is greatest.

CONCLUSIONS.

(1) Pneumonia is endemic in this country. The excess of pneumonia in large towns is not due to differences of age distribution, the mortality-rates in towns being higher at all ages.

(2) Fog and black smoke affect contiguous districts in our cities equally, but it is only in overcrowded districts that the mortality is excessive.

(3) Climatic conditions are contributing factors. It is not the cold weather in itself which causes pneumonia, but the behaviour of persons in cold weather which induces colds and catarrhs. It is not possible to draw a distinct line between pharyngitis, laryngitis, bronchitis and broncho-pneumonia. The majority of the population suffer from one or more colds during the year. After an investigation in Pittsburgh, U.S.A., it was estimated that the number of common colds per person each year was three, and, out of 2,507 cases of pneumonia, it was found that 71 per cent. had a history of preceding cold.

An endeavour was made in Manchester to ascertain the origin of 1,000 cases of pneumonia in children under five years of age during 1925 and 1926. 517, or 51·7 per cent. of the children had previously suffered from pneumonia or bronchitis, or were the subjects of repeated colds. The percentage in the case of lobar pneumonia was 48, and in broncho-pneumonia 56. It would appear, therefore, that pneumonia, especially broncho-pneumonia, frequently has its origin in a common cold or attacks those whose vitality is lowered by chronic catarrhal conditions. This catarrhal state is most common amongst children living in an overcrowded environment, in badly ventilated living and sleeping rooms, faced as they are by the chances of mass infection repeated over and over again.

(4) There is, therefore, considerable evidence showing that overcrowding on area, and in individual houses, is directly responsible for the high incidence of pneumonia. If this view be accepted, the remedy lies in the development of our housing and town-planning schemes. Every additional open space provided in our towns, every slum area demolished, whether large or small, every effort made to clear the centre of our cities and to re-house under hygienic conditions will tend to reduce the mortality from these diseases.

I have to thank the Medical Officer of Health for the City of Manchester for permission to carry out this investigation.

REFERENCES.

[1] *Registrar General's Annual Supplements.* [2] *Annual Reports, Scottish Board of Health.* [3] "Book of Normals." [4] VAUGHAN, "Epidemiology and Public Health." [5] *Annual Reports Medical Officer of Health, Manchester.*

Discussion.—Sir WILLIAM HAMER: This very interesting paper calls to mind the finding of Chalmers that epidemic diseases of the central nervous system are *endemic* in Glasgow. Dr. McClure holds that pneumonia, too, is an endemic disease and has a periodicity identical with that of influenza. In the fifth section of the "Medical Observations," however, influenza appears in a complete setting of cerebro-spinal, pulmonary and gastro-intestinal prevalences. Thus Sydenham, describing the "Constitution" of 1675, says, "The fever exhibited the

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symptoms of dysentery and diarrhœa . . . it attacked the head . . . but everyone who had any practice among the sick knew the predominance of the fever and knew that the aforesaid dysentery and diarrhœa were symptoms rather than essential and primary diseases." Then came "coughs and catarrhs . . . the fever, however, remained the same as before." He adds, "All that I know is what I know well . . . that all the diseases which have originated from it have been the same." There follow detailed descriptions of the precursory "lethargies" and "stupors," of the widespread July prevalence, of the pneumonias of October and November and of the return of the "stupors" and "lethargies." The voice speaks from the far-away seventeenth century, but how accurately the description fits the 1918 constitution! It is not merely pneumonia, then, it is not merely cerebro-spinal fever that concerns us, our quarry is that elusive endemic disease "influenza in mufti." Some of those present to-night may live to see the day when prevalent obsessions regarding clinical entities, pathognomonic signs and immutable causal organisms will cease to obscure great issues. Honest Dogberrys will then admonish any die-hard Borachios and Conrades who still persist in disgracing the Lady Epidemiology before the whole assembly; will tell them "it is proved already that they are little better than false knaves, and it will go near to be thought so shortly"; and will appropriately intimate to them that they "will be condemned into everlasting redemption for this."

Professor GREENWOOD said he doubted whether the relation between temperature and mortality from pneumonia could be satisfactorily evaluated by means of data covering so wide an area as those of Table IV (p. 51) and quoted results obtained by himself and his colleagues, or by Dr. Matthew Young, leading to the conclusion that the fairly steady negative correlation between the death-rate from pneumonia of one week, and the mean air temperature of the previous week (London) was chiefly due to the death-rate in later life and not to that affecting young children. Professor Greenwood also urged the importance of separately considering the rates of mortality in age-groups, and summarized some unpublished results of Miss Hilda Woods, which suggested that the mortality from pneumonia of young children was highly, of adults under 65 significantly, and of persons over 65 hardly at all, correlated with measures of domestic overcrowding, such as the proportion of the population housed more than two to a room. He hoped that Dr. McClure would add to the obligation under which he had placed the Section of Epidemiology and State Medicine by preparing a further, and still more detailed, paper upon the respiratory mortality of Manchester.

Dr. G. CLARK TROTTER (Medical Officer of Health, Islington) referred particularly to the point raised by Dr. McClure in distinguishing between bronchitis, lobar pneumonia and broncho-pneumonia. It was wise to remember that, in a sense, the patient did not die from a particular disease, but died "of the opinion of the doctor last attending," except in the case in which there was a coroner's finding. Thus, as Dr. McClure had indicated, the cases regarded as bronchitis, as broncho-pneumonia, or as lobar pneumonia, were only relatively accurate. This, of course, as far as the paper was concerned, did not matter; some cases went under one classification and some under another, and the error was thus compensated.

It would be interesting to know whether in Manchester there was a scheme for home nursing and, if it could be pointed out, its effect in reducing the mortality. While housing undoubtedly was a potent factor, and the greater mortality could be ascribed to overcrowded conditions, it was necessary to remember that in the better home there was probably better nursing attention given to the case, and that there was a larger percentage of recoveries where the child was nursed and attended to with skill.

The hospital treatment of cases was sometimes unjustly criticized. The hospitals received cases in a fairly advanced stage, and the mortality was necessarily high. On the other hand, when a larger number of cases than was normally accommodated had to be taken into hospital, it was necessary to consider carefully whether the conditions in a crowded hospital were really better than would be obtainable in treatment of a case at home with nursing provided. The removal to hospital of a nervous child might be detrimental, and, in the particular case, such a patient might be better nursed at home. These were exceptional cases, of course, but they were worthy of consideration. On the whole, the majority of cases from the poorer districts were better treated in hospital than at home.

Dr. GEORGE JONES said that the effect of overcrowding depended on the habits of the overcrowded persons; the Jews, for instance, could flourish in conditions under which the English degenerated.